

# 2007 RESEARCH PROBLEM STATEMENT

**Problem Title:** Costs of Winter Maintenance on Asphalt vs. Concrete Pavements

**No.:** 07.02-8

**Submitted By:** Norton Thurgood

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**Project Champion:** Norton Thurgood

(UDOT or FHWA employee who needs this research done, will help the Research Division lead this project, and will spearhead the implementation of the results. If the project gets prioritized at the UTRAC conference, a Champion Commitment Form will be required before funding.)

## 1. Briefly describe the problem to be addressed.

Is there a difference in winter maintenance costs between Concrete and Asphalt pavements?. Validate pavement type/selection for winter maintenance effectiveness. Variables include traffic volume, elevation, solar insolation, shading. Concrete pavements have some advantages over flexible pavements such as less rutting and less of the "Heat Island Effect" in around major Cities. Some studies suggest that user costs are less on concrete due to better gas mileage and that this results in less pollution. However, my experience has been that because concrete is colder, maintenance forces must use significantly more salt, sand, and other chemicals to maintain safe, or bare pavements versus asphalt, resulting in increased maintenance costs and pollution. In addition, in my area, which covers all of the counties in Northern Utah, North of Ogden, we have had to close our sections of concrete pavements much more than we have asphalt resulting in increased user cost due to down time. Over the last decade, cities and DOTs across the United States and Canada aggressively researched and implemented strategies to reduce the amount of sand and salt used in winter operations. A Connecticut study shows both nations moving rapidly away from sand to salt. How will this impact the life expectancy of concrete pavements. Are the benefits of concrete pavements in some areas negated by increased winter maintenance costs, and user costs due to closures, and environmental issues from increased salt usage.

**2. Strategic Goal:** ☒ Preservation ☒ Operation ☒ Capacity ☒ Safety (check all that apply)

## 3A. List the research objective(s) to be accomplished:

1. How much more costly is it to maintain a concrete pavement in the winter versus an adjacent or geographically similar asphalt pavement? How much does this cost negate the benefits of life cycle maintenance cost in concrete versus asphalt?
2. How many more tons of chemicals does it take to reach bare pavement with concrete versus asphalt and how does this amount affect pM10's and salts in runoff?
3. If we tend to use more salts, and the newest wave in anti-icing chemicals, potassium, on concrete to anti-ice and de-ice, will this also negate the benefits of concrete, especially in white topping, by significantly reducing expected life span?
4. If winter maintenance costs and user loss costs due to accidents and closures are significantly higher on concrete sections, especially in higher snow and ice prone area's, does this tip the scales in favor of rehabilitating some concrete pavement sections using crack & seat and asphalt surfacing?

## 3B. List the major tasks to accomplish the research objective(s):

**Estimated person-hours:** 450

1. Literature search
2. Compare the amount of equipment, personnel, material, and time, used to reach bare pavements on concrete sections vs. adjacent or geographically similar asphalt sections.
3. Study the accident history of sections constructed as concrete that have subsequently been crack seated and asphalted, vs. previous years. For example, I-15, from South Willard to 12<sup>th</sup> street, in the Ogden area.
4. Study integrity of white top sections that have been placed in areas prone to aggressive winter maintenance.
5. Determine annual winter maintenance cost

**4. Estimate the cost of this research study including implementation effort (use person-hours from No. 3B):** \$20,000

## 5. Indicate type of research and/or development project this is

Large: ☒ Research Project ☐ Development Project  
Small: ☐ Research Evaluation ☐ Experimental Feature ☐ New Product Evaluation ☐ Tech Transfer Initiative  
☐ Other: \_\_\_\_\_

(A small project is usually less than \$20,000 and shorter than 6 months)

**6. Outline the proposed schedule (when do you need this done, and how will we get there):**

Spring 2007 Select study routes and do literature search and accident history.

Summer 2007 Begin coring and analyzing white top sections.

Winter 2007/2008 begin tracking resources used on various study routes.

Spring 2008 Analyze data

**7. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?**

University and UDOT

**8A. What deliverables would you like to receive at the end of this project?** (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)

Report & guidance on making this information part of the decision tree with regard to concrete versus asphalt.

**8B. Describe how this project will be implemented at UDOT.**

Research would do a literature search. UDOT maintenance stations in selected areas would record the amount of resources used on both types of routes over the winter along with time to bare road. University would core and analyze white top pavements in selected areas to discover the condition of the pavement and the effects of chemicals trapped between old asphalt and the white top.

**8C. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.**

If the costs of winter maintenance, closures, accidents, and an associated shortened life cycle due to increased use of salt demonstrate that cement life cycle costs may not be as great as we think, in some cases this may tip the scales when trying to decide how best to re-habilitate a concrete pavement, or construct a new one.

**9. Describe the expected risks and obstacles as well as the strategies to overcome them.**

Winter maintenance personnel buy in. Choose dedicated and trusted route owners.

Finding routes that will make good comparisons. We already have some in region one.

If there is not enough specific data available, provide recommendations for future data collection

**10A. List other people (UDOT and non-UDOT) who are willing to participate in the Technical Advisory Committee (TAC) for this study:**

<u>Name</u>	<u>Organization / Division / Region</u>	<u>Phone</u>	<u>Email</u>
Frank May	Brigham City Station Supervisor	435-723-5784	Fmay@utah.gov
Rick Pro	Ogden Station Supervisor	801-394-2234	RPro@Utah.gov
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Lynn Bernhard	Maintenance Planning Division	801-964-4597	lynnbernhard@utah.gov
Scott Nussbaum			
Betty Purdie			

**10B. Identify other Utah, regional, or national agencies and other groups that may have an interest in supporting this study:**